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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,654	01/25/2007	Arno Seeboth	5690.172	6189
20792 7590 05/28/2008 MYERS BIGEL, SIBLEY & SAJOVEC PO BOX 37428 RALEIGH, NC 27627				
EXAMINER				
AHVAZI, BILAN				
ART UNIT		PAPER NUMBER		
4171				
MAIL DATE		DELIVERY MODE		
05/28/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/549,654

Applicant(s)

SEEBOTH ET AL.

Examiner

Bijan Ahvazi

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-29 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 14-29 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/55/08)
Paper No(s)/Mail Date 04/17/2008
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____

DETAILED ACTION

Claim Objections

1. Claims 14-29 are objected to because of the following informalities:
2. Regarding claim 14, the examiner notes that the applicants use the term "thermoset" as noun, it is really an adjective which should modify a noun, in this case "resin". The applicants "short hand" terminology should be corrected through out the claims.
3. Regarding claim 16, the applicants description of the "protective shield" is confusing and redundant. It is not clear why the applicants use both "and/or" and then "mixtures thereof". The examiner suggests conventional language such as "consists of a surface active substance, a polymer, or mixtures thereof".
4. Regarding claims 19 and 29, each claim begins with a capital letter and ends with a period. Periods may not be used elsewhere in the claims except for abbreviations. See *Fressola v. Manbeck*, 36 USPQ2d 1211 (D.D.C. 1995). Appropriate correction is required. Claims need to be presented in the form of a sentence. This is not the case.
5. Additionally, these claims fail to use proper alternative claim language (Markush).

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
7. Claims 14-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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8. Applicants claim that the composition is a "composite" the accepted meaning of composite is that one has a more than one physically distinct materials together. In the instant application the applicants' state "a mixture... which has at least one of each of the following components:" It is unclear how only one of these materials makes a composite as claimed. It appears on its face that applicants need to clearly state what forms the other phase of the composition. Are the "starting components for the production of the thermoset" part of the Markush group are they the other component that make up the "composite"?
9. Regarding claim 18, this claim is very confusing on a number of levels. There is no antecedent basis for "the critical micelle concentration". Micelles are never mentioned previously and it is unclear if micelles are actually present or if this is "functional language" related to the capability of forming micelles
10. Regarding claim 21, the examiner notes that this claim is not further limiting the subject matter of claim 14. A "thermochromic" material by definition must have a color change related to a change in temperature. The subject matter of this claim is already present in claim 14.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102(b) that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) The invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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12. Claims 14-17, 19, 21, 22, 25, 26, 27, 28 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Senga *et al.* (Pat. No. US 6,485,824 B2).

The applicants claim: a composition for the preparation of a thermoset having thermochromic properties, consisting of a mixture of a thermochromic composite, which has at least one of each of the following components: colorant, developer, flux, surface-active substance, polymer, and starting components for the production of the thermoset.

13. Senga *et al.* discloses a reversibly thermochromic light-shielding/light-transmitting laminate member. More particularly, it relates to a reversibly thermochromic light-shielding/light-transmitting laminate member which changes not only in color but in transmittance with temperature. A reversibly thermochromic light-shielding/light-transmitting laminate member which comprises a substrate and formed a reversibly thermochromic layer comprising a transparent resin and fixedly dispersed a reversibly thermochromic microencapsulated pigment (Col 8, line 65, Example1) containing a reversibly thermochromic composition comprising (a) an electron-donating color-forming organic compound such as 1,2-benz-6-(N-ethyl-N-isobutylamino)fluoran (colorant) , (b) an electron-accepting compound such as 2,2-bis(4-hydroxyphenyl)hexafluoropropane (developer) , and (c) a reaction medium such as neopentyl stearate (flux), determining the temperatures at which the color reactions of component (a) with component (b) take place, the reversibly thermo chromic microencapsulated pigment such as 1,1-bis(4-hydroxyphenyl)-n-decane (surfactant), polymer such as poly(vinyl alcohol), diheptadecyl ketone as a color change temperature regulator, an aqueous solution of diethylenetriamine is added dropwise to the emulsion to encapsulate the reversibly thermochromic composition with an aromatic polyisocyanate prepolymer as a wall material (made of a polyurea resin which was formed from the polyisocyanate and the amine and a co-

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solvent as well as the transparent resin corresponding to the applicant's limitation claims 14 and 15. The transparent resin is preferably a resin selected from the group consisting of methyl methacrylate resins, acrylic resins, vinyl chloride/vinyl acetate copolymer resins, ethylene/vinyl acetate copolymer resins, saturated polyester resins, unsaturated polyester resins, butyral resins, polyurethane resins, polyamide resins, styrene resins, acrylic/styrene resins, ketone resins, and epoxy resins. Furthermore, the laminate member has formed over the reversibly thermochromic layer, a metallic glossy layer containing a metallic luster pigment having transparency corresponding to the instant applicant's limitation claims 16, 17 and 19 (Col 1, line 50). Furthermore, the laminate member, which undergoes alternate color changes between a colorless transparent state and a colored opaque state with temperature (Col 2, line 18) corresponding to the instant applicant's limitation claim 21, is obtained based on a combination of a reversibly thermochromic microencapsulated pigment having an average particle diameter of from 0.1 to 5.0 μm with a transparent resin having a tensile elongation at break of 350% or lower, as stated above. In the all the disclosed example in the reference, the resultant mixture is homogenized to obtain a solution, i.e. isotropic thermoset (Col 10, line 9) which correspond to the instant limitation claim 27.

Regarding the instant applicant limitation claims 22 and 25, the example 2 of Senga *et al.* relate to the disclosure of the microencapsulated pigment which is a thermochromic microencapsulated pigment that become colorless upon heating to 35 °C or higher and turned blue upon cooling to 25 °C or lower (Col 10 , line 23). Furthermore reference discloses the reversible thermochromic light-shielding/light-transmitting laminate member. Upon cooling to 25 °C or lower, the reversibly thermochromic composition assume a blue color and, simultaneously therewith, the reversibly thermochromic layer became opaque. As a result, the engine (the shaped plastic article modeled on an engine is placed in the space under the hood)

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is hidden and the minicar appears to be wholly blue. When the laminate member was heated to 35 °C or higher, the reversibly thermochromic composition was decolored and, simultaneously therewith, the reversibly thermochromic layer became highly transparent. As a result, the engine can be perceived through the transparent substrate (Col 10, line 50) that meets the instant applicant limitation claim 26.

In the example 1 disclosure of Senga *et al.* a teddy bear as a shaped article is placed in the hemisphere and a white ABS plate lid is fixed to the bottom of the hemisphere to enclose the teddy bear. In the reversibly thermochromic light-shielding/light-transmitting laminate member had a thickness of about 60 µm, and 6 µm in the comparative case. Upon cooling to 12 °C or lower, the reversibly thermochromic composition assumed a pink color and, simultaneously therewith, the reversibly thermochromic layer became opaque. As a result, the teddy bear is hidden and the hemisphere becomes pink. When the laminate member was heated to 36 °C or higher, the reversibly thermochromic composition is decolored and, simultaneously therewith, the reversibly thermochromic layer became highly transparent. As a result, the teddy bear enclosed in the hemisphere could be perceived through the transparent substrate. However, in the comparative example 1, When the laminate member is heated to 36 °C or higher, the reversibly thermochromic composition is decolored but the reversibly thermochromic layer had poor transparency. As a result, not only the feeling of transparency given by the substrate was impaired but also the teddy bear enclosed could not be clearly perceived which meet the instant applicant limitation claim 28. Additionally, all the above components of the thermochromics composite in the reference present functionally within a supramolecular molecule structure that satisfies the instant applicant limitation claim 29. Therefore all the instant application claims 14-17, 19, 21, 22, 25, 26, 27, 28 and 29 are as being anticipated by Senga *et al.*

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 18, 20, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senga *et al.* (Pat. No. US 6,485,824 B2) in view of Fujita *et al.* (Pat. No. US 6,494,950 B1).

16. Senga *et al.* discloses a reversibly thermochromic light-shielding/light-transmitting laminate member. A reversibly thermochromic light-shielding/light-transmitting laminate member which comprises a substrate and formed a reversibly thermochromic layer comprising a transparent resin and fixedly dispersed a reversibly thermochromic microencapsulated pigment (Col 8, line 65, example1) corresponding to the applicants' limitation claim 18 and 20 containing a reversibly thermochromic composition comprising (a) 3 parts of an electron-donating color-forming organic compound such as 1,2-benz-6-(N-ethyl-N-isobutylamino)fluoran (colorant) , (b) 2 parts of an electron-accepting compound such as 2,2-bis(4-hydroxyphenyl)hexafluoropropane (developer) , and (c) 50 parts of a reaction medium such as neopentyl stearate (flux), determining the temperatures at which the color reactions of component (a) with component (b) take place, the reversibly thermochromic microencapsulated pigment such as 10 parts of 1,1-bis(4-hydroxyphenyl)-n-decane

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(surfactant), polymer such as poly(vinyl alcohol), 3 parts of diheptadecyl ketone as a color change temperature regulator, 5 parts of an aqueous solution of diethylenetriamine is added dropwise to the emulsion to encapsulate the reversibly thermochromic composition with 30 parts of an aromatic polyisocyanate prepolymer as a wall material (made of a polyurea resin which was formed from the polyisocyanate and the amine and a 40 parts of co-solvent as well as the transparent resin, preferably from 1/0.5 to 1/20 (in terms of weight ratio on a solid basis). However, Senga *et al.* does not explicitly disclose the amount of polymer is utilized (% weight) during the reaction and the concentration of surfactant which reached or exceed the critical micelle concentration.

Fujita *et al.* discloses the Disclosed is a thermochromic microencapsulated pigment which comprises as four essential components (a) an electron-donating chromatic organic compound, (b) an electron-accepting compound, (c) a reaction medium determining the temperatures at which the color reactions of component (a) with component (b) take place, and (d) a color change temperature regulator, the color change temperature regulator (d) comprising one or more compounds selected from the group consisting of esters, alcohols, ketones, acid amides, hydrocarbons, and fatty acids and having a melting point Y ($^{\circ}\text{C}$) satisfying the relationship $(X+30)^{\circ}\text{C} \leq Y \leq 200^{\circ}\text{C}$, wherein X ($^{\circ}\text{C}$) is the melting point of component (c), and the four essential components being microencapsulated (abstract). Table 2 below shows the thermochromic microencapsulated pigment of each example in which a marked color change take place with in a temperature range corresponding to the applicants' limitation claim 23 and 24. However, Fujita *et al.* does not explicitly disclose the amount of polymer is utilized (% weight) during the reaction.

TABLE 2

	Average particle diameter	T ₁ (°C)	T _{1/2} (°C)	T ₂ (°C)	T ₃ (°C)	T ₀ (°C)	T _a (°C)	ΔH (°C)
Ex. 1	6.0 μm	16.0	18.0	20.0	25.0	32.5	36.0	14.5
Ex. 2	6.0 μm	26.0	29.5	33.0	38.0	32.0	36.0	2.5
Ex. 3	2.0 μm	20.0	26.0	32.0	24.0	31.0	36.0	5.0
Ex. 4	1.0 μm	4.0	13.0	22.0	6.0	15.0	24.0	2.0
Ex. 5	0.5 μm	28.0	31.0	37.0	30.0	36.0	42.0	5.0
Ex. 6	0.7 μm	17.0	22.0	27.0	25.0	30.0	35.0	4.0
Ex. 7	0.7 μm	14.0	18.0	22.0	24.0	30.0	36.0	12.0
Ex. 8	0.5 μm	12.0	15.0	18.0	26.0	30.5	35.0	15.5
Ex. 9	1.0 μm	25.0	30.5	35.5	27.0	32.5	36.0	2.0

It is the examiner's position that the composition of thermoset having thermochromic properties in which the components of the composition in concentration as the instant applicant claims 18 and 20 are highly depended on the stability of dye, polymer composition, and cross-linking concentration materials. The reasonable experimental value can achieve only by optimization depending on the experiment and material used during the reaction. Therefore at the time of the invention, it would have been obvious to a person of ordinary skill in the art to include teaching materials of Fujita *et al.* in thermochromic light-shielding/light-transmitting laminate member of Senga *et al.* with the motivation to provide a composition for the preparation of a thermoset having thermochromic properties, consisting of a mixture of a thermochromic composite and starting components for the production of the thermoset.

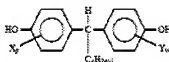
Prior-Art Cited But Not Applied

Any prior-art reference which is cited on FORM PTO-892 but not applied is cited to show the general state of the prior-art at the time of the application's invention. Faran *et al.* (WO 02/08821 A1) discloses a reversible thennochromic composition comprising (1) a main organic component, capable to change its color upon applying thermal energy thereto and (2) an auxiliary organic component, rendering said main organic component the capability to change

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its color at predetermined temperature. Both components are incorporated within a polymer matrix. The articles made of this composition change their color or became colorless at predetermined temperature and they have accurate temperature response. The manufacturing process is simple, inexpensive and can be carried out by conventional technology routes.

Fujita *et al.* (Pat. No. US 5,873,932) teaches A method of causing metachromatism by the use of a reversible thermochromic composition comprising (a) an electron donating compound, (b) an electron accepting compound and (c) a metachromatic temperature adjuster, wherein; (d) an electron accepting, light-fastness providing agent represented by Formula I:

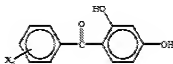


Wherein n represents an integer of 5 to 17 to form a straight-chain or branched alkyl group; X and Y each represent a straight-chain or branched alkyl group having 1 to 4 carbon atoms, or a halogen atom; and p and m each represent an integer of 0 to 3; is brought into presence in an amount of 0.3 part by weight to 70 parts by weight based on 1.0 part by weight of the component-(a) electron donating compound. The light-fastness of the reversible thermochromic composition at the time of color development can be greatly improved.

Nakashima *et al.* (Pat. No. US 6,638,620 B2) discloses a reversible thermochromic composition which can be freely adjusted in its discoloration temperature even if the kind of electron donating compound and electron accepting compound to be used in combination remain the same and exhibits a remarkably improved light-fastness during quenching. A reversible thermochromic composition having an improved light-fastness comprising (a) an

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electron donating compound, (b) an electron accepting compound ultraviolet absorbing capacity represented by the following general formula I:



Wherein X represents a hydrogen atom, $-C_nH_{2n+1}$ or $-OC_mH_{2m+1}$; m represents an integer of from 1 to 9; n represents an integer of from 1 to 10; and p represents an integer of from 1 to 3, and (c) a discoloration temperature adjustor and a product comprising same. Kito *et al.* (Pat. No. US 5,585,425) discloses a thermochromic opaque/transparent composition is capable of exhibiting change in transparency together with change in color in response to temperature variation, a laminate member employing the same, and a three-dimensional article capable of concealing and revealing the interior, utilizing the laminate member. A thermochromic opaque/transparent composition is composed of dispersion, in vinyl chloride/vinyl acetate copolymer matrix resin, which has been obtained by blending with hindered amine compound selected from piperidine derivatives within a particle size range of 0.1 to 2.0 μm , of a reversible thermochromic material consisting of (a) an electron-donating color-developing organic compound, (b) a compound having a phenolic hydroxyl radical, and (c) a homogeneous fused composition containing a compound selected from alcohols, esters, ketones and carboxylic acids, and capable of exhibiting reversible change in transparency together with change in color in response to temperature variation, with hysteresis with a temperature difference of 10 $^{\circ}\text{C}$ to 50 $^{\circ}\text{C}$, between the low and high trigger temperatures.

Examiner Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bijan Ahvazi whose telephone number is (571)270-3449. The examiner can normally be reached on M-F 8:0-5:0. (Off every other Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
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